UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,833	11/12/2003	Mark R. Fernald	CC-0676	9515

7590 03/08/2005

Robert D. Crawford
CiDRA Corporation
50 Barnes Park North
Wallingford, CT 06492

EXAMINER	
WASHBURN, DOUGLAS N	
ART UNIT	**PAPER NUMBER**
2863	

DATE MAILED: 03/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/712,833	FERNALD ET AL.	
	Examiner	Art Unit	
	Douglas N Washburn	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12, 16-27* is/are rejected.

7)☒ Claim(s) *13-15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12 October 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1 The disclosure is objected to because of the following informalities:

Page 8, lines 29-31 recite "Figs. 3 and 4 illustrate a piezoelectric film sensor (similar to the sensor 18 of Fig. 1a), wherein the piezoelectric film 32 is disposed **between and pair of** conductive coatings 34,35, such as silver ink.";

Examiner suggests "Figs. 3 and 4 illustrate a piezoelectric film sensor (similar to the sensor 18 of Fig. 1a), wherein the piezoelectric film 32 is disposed between a pair of conductive coatings 34,35, such as silver ink."

Correction is required.

Claim Objections

2 Claim 11 is objected to because of the following informalities:

Claim 11 "The apparatus of claim 9, wherein **each the pair of conductors** is a coating of silver ink." Correction is required.

Claim Rejections - 35 USC § 101

3 A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 1, 2 and 4-25 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1 and 3-24 of copending Application No. 10712818. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

More specifically, each claim corresponds to the other as follows:

10712833 (instant application)	10712818 (copending application)
Claim number	Claim number
1	1
2	1
4	3
5	4
6	5
7	6
8	7
9	8
10	9
11	10
12	11
13	12
14	13
15	14
16	15
17	16
18	17
19	18
20	19
21	20
22	21
23	22
24	23
25	24

Claim correspondence 10712833 (instant application)	10712818 (copending application)
Claim number	Claim number
1. An apparatus for measuring at least one parameter of a process flow flowing within a pipe, the apparatus comprising: at least two pressure sensors clamped onto the outer surface of the pipe at different axial locations along the pipe, each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position, each of the pressure sensors comprising: a piezoelectric film sensor; and a signal processor, responsive to said pressure signals, which provides a signal indicative of at least one parameter of the process flow flowing within the pipe. 2. The apparatus of claim 1, wherein each of the pressure sensors further include a strap for attaching the piezoelectric film sensor thereto.	1. An apparatus for measuring at least one parameter of a process flow flowing within a pipe, the apparatus comprising: at least two pressure sensors clamped onto the outer surface of the pipe at different axial locations along the pipe, each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position, each of the pressure sensors comprising: a strap, and a piezoelectric film sensor attached to the strap; and a signal processor, responsive to said pressure signals, which provides a signal indicative of at least one parameter of the process flow flowing within the pipe.
4. The apparatus of claim 1, wherein the piezoelectric film sensor is attached to the outer surface of the strap and/or the inner surface of the strap.	3. The apparatus of claim 2, wherein the piezoelectric film sensor is attached to the outer surface of the strap and/or the inner surface of the strap.
5. The apparatus of claim 1, wherein the strap is a metallic material.	4. The apparatus of claim 2, wherein the strap is a metallic material.
6. The apparatus of claim 1, further includes a clamping device for attaching the ends of one of the pressure sensors to clamp the pressure sensor onto the pipe.	5. The apparatus of claim 2, further includes a clamping device for attaching the ends of one of the pressure sensors to clamp the pressure sensor onto the pipe.
7. The apparatus of claim 1, wherein the pressure sensors are removably clamped to the pipe.	6. The apparatus of claim 2, wherein the pressure sensors are removably clamped to the pipe.
8. The apparatus of claim 1, wherein the pressure sensors are permanently clamped to the pipe.	7. The apparatus of claim 2, wherein the pressure sensors are permanently clamped to the pipe.
9. The apparatus of claim 1, wherein the piezoelectric film sensor includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT.	8. The apparatus of claim 1, wherein the piezoelectric film sensor includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT.

Claim correspondence 10712833 (instant application)	10712818 (copending application)
10. The apparatus of claim 1, wherein the piezoelectric film includes a pair of conductors 5 disposed on opposing surfaces of the piezoelectric-film.	9. The apparatus of claim I, wherein the piezoelectric film includes a pair of conductors disposed on opposing surfaces of the piezoelectric-film.
11. The apparatus of claim 9, wherein each the pair of conductors is a coating of silver ink.	10. The apparatus of claim 10, wherein each the pair of conductors is a coating of silver ink.
12. The apparatus of claim 1, wherein the piezoelectric film extends around a substantial portion of the circumference of the pipe.	11. The apparatus of claim 1, wherein the piezoelectric film extends around a substantial portion of the circumference of the pipe.
13. The apparatus of claim 1, wherein the piezoelectric film has a thickness greater than 8 mm.	12. The apparatus of claim 1, wherein the piezoelectric film has a thickness greater than 8 mm.
14. The apparatus of claim 1, wherein the piezoelectric film has a thickness between 8 mm and 120 mm.	13. The apparatus of claim 1, wherein the piezoelectric film has a thickness between 8 mm and 120 mm.
15. The apparatus of claim 1, further includes an electrical insulator between the piezoelectric film and the strap.	14. The apparatus of claim 1, further includes an electrical insulator between the piezoelectric film and the strap.
16. The apparatus of claim 1, wherein the pressure signals are indication of acoustic pressures propagating within the pipe.	15. The apparatus of claim 1, wherein the pressure signals are indication of acoustic pressures propagating within the pipe.
17. The apparatus of claim 1, wherein the parameter of the fluid is one of steam quality or "wetness", vapor/mass ratio, liquid/solid ratio, volumetric flow rate, mass flow rate, size of suspended particles, density, gas volume fraction, and enthalpy of the flow.	16. The apparatus of claim 1, wherein the parameter of the fluid is one of steam quality or "wetness", vapor/mass ratio, liquid/solid ratio, volumetric flow rate, mass flow rate, size of suspended particles, density, gas volume fraction, and enthalpy of the flow.
18. The apparatus of claim 1, wherein the signal processor determines the slope of an acoustic ridge in the k-w plane to determine a parameter of the process flow flowing in the pipe.	17. The apparatus of claim 1, wherein the signal processor determines the slope of an acoustic ridge in the k-w plane to determine a parameter of the process flow flowing in the pipe.
19. The apparatus of claim 1, wherein the pressure signals are indication of vortical disturbances within the fluid flow.	18. The apparatus of claim 1, wherein the pressure signals are indication of vortical disturbances within the fluid flow.
20. The apparatus of claim 18, wherein the parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid.	19. The apparatus of claim 19, wherein the parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid.
21. The apparatus of claim 1, wherein the signal processor determines the slope of a convective ridge in the k-w plane to determine the velocity of the fluid flowing in the pipe.	20. The apparatus of claim 1, wherein the signal processor determines the slope of a convective ridge in the k-w plane to determine the velocity of the fluid flowing in the pipe.
22. The apparatus of claim 1, wherein the signal processor determines the volumetric flow 15 rate of the fluid flowing in the pipe in response to the velocity of the fluid.	21. The apparatus of claim 1, wherein the signal processor determines the volumetric flow 15 rate of the fluid flowing in the pipe in response to the velocity of the fluid.

Claim correspondence 10712833 (instant application)	10712818 (copending application)
23. The apparatus of claim 1, wherein the signal processor generates a flow velocity signal indicative of the velocity of the fluid flowing within the pipe by cross-correlating the pressure signals.	**22. The apparatus of claim 1, wherein the signal processor generates a flow velocity signal indicative of the velocity of the fluid flowing within the pipe by cross-correlating the pressure signals.**
24. The apparatus of claim 1 wherein each sensor measures an acoustic pressure and provides a signal indicative of an acoustic noise within the pipe.	**23. The apparatus of claim I wherein each sensor measures an acoustic pressure and provides a signal indicative of an acoustic noise within the pipe.**
25. The apparatus of claim 1 further comprising at least three of said pressure sensors.	**24. The apparatus of claim 1 further comprising at least three of said pressure sensors.**

Claim Rejections - 35 USC § 102

4 The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4-8, 16-18, 24 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Gysling et al. (US 6,354,147) (Hereafter referred to as Gysling 4147).

Gysling 4147 teaches:

At least two pressure sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position, each of the pressure sensors comprising a piezoelectric film sensor in regard to claim 1

(e.g.; column 2, lines 1-11; figures 1, 19, 29 and 30);

A signal processor, responsive to said pressure signals, which provides a signal indicative of at least one parameter of a process flow flowing within a pipe in regard to claim 1

(e.g.; column 2, lines 1-11);

A strap in regard to claim 2

(e.g.; column 19, lines 12-21);

A piezoelectric film sensor is attached to the outer surface of a strap and/or the inner surface of the strap in regard to claim in regard to claim 4

(e.g.; column 19, lines 12-21);

A strap is a metallic material in regard to claim 5

(e.g.; column 19, lines 12-21);

A clamping device for attaching the ends of a pressure sensor to clamp the pressure sensor onto a pipe in regard to claim 6

(e.g.; column 19, lines 12-21);

Pressure sensors are removably clamped to a pipe in regard to claim 7

(e.g.; column 19, lines 12-21);

Pressure sensors are permanently clamped to a pipe in regard to claim 8

(e.g.; column 19, lines 12-21);

Pressure signals are indication of acoustic pressures propagating within a pipe in regard to claim 16

(e.g.; column 2, lines 1-11);

A parameter of a fluid is one of steam quality or "wetness", vapor/mass ratio, liquid/solid ratio, volumetric flow rate, mass flow rate, size of suspended particles, density, gas volume fraction, and enthalpy of a flow in regard to claim 17

(e.g.; column 2, lines 66 et seq; column 3, lines 1-9);

A signal processor determines the slope of an acoustic ridge in the k-w plane to determine a parameter of the process flow flowing in the pipe in regard to claim 18

(e.g.; column 23, lines 5-23);

Each sensor measures an acoustic pressure and provides a signal indicative of an acoustic noise within a pipe in regard to claim 24

(e.g.; column 8, lines 49-53);

And at least three pressure sensors in regard to claim 25

(e.g.; column 5, lines 50-52; figure 1, elements 14, 16 and 18).

Claim Rejections - 35 USC § 103

5 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3, 9-12, 19-23 , 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gysling 4147 in view of Gysling et al. (US 2004/0069069) (Hereafter referred to as Gysling 9069).

Gysling 4147 teaches:

At least two pressure sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position, each of the pressure sensors comprising a piezoelectric film sensor in regard to claim 1

(e.g.; column 2, lines 1-11; figures 1, 19, 29 and 30);

A signal processor, responsive to said pressure signals, which provides a signal indicative of at least one parameter of a process flow flowing within a pipe in regard to claim 1

(e.g.; column 2, lines 1-11);

A strap in regard to claim 2

(e.g.; column 19, lines 12-21);

A piezoelectric film sensor is attached to the outer surface of a strap and/or the inner surface of the strap in regard to claim in regard to claim 4

(e.g.; column 19, lines 12-21);

A strap is a metallic material in regard to claim 5

(e.g.; column 19, lines 12-21);

A clamping device for attaching the ends of a pressure sensor to clamp the pressure sensor onto a pipe in regard to claim 6

(e.g.; column 19, lines 12-21);

Pressure sensors are removably clamped to a pipe in regard to claim 7

(e.g.; column 19, lines 12-21);

Pressure sensors are permanently clamped to a pipe in regard to claim 8

(e.g.; column 19, lines 12-21);

Pressure signals are indication of acoustic pressures propagating within a pipe in regard to claim 16

(e.g.; column 2, lines 1-11);

A parameter of a fluid is one of steam quality or "wetness", vapor/mass ratio, liquid/solid ratio, volumetric flow rate, mass flow rate, size of suspended particles, density, gas volume fraction, and enthalpy of a flow in regard to claim 17

(e.g.; column 2, lines 66 et seq; column 3, lines 1-9);

A signal processor determines the slope of an acoustic ridge in the k-w plane to determine a parameter of the process flow flowing in the pipe in regard to claim 18

(e.g.; column 23, lines 5-23);

Each sensor measures an acoustic pressure and provides a signal indicative of an acoustic noise within a pipe in regard to claim 24

(e.g.; column 8, lines 49-53);

And at least three pressure sensors in regard to claim 25

(e.g.; column 5, lines 50-52; figure 1, elements 14, 16 and 18).

Gysling 4147 is silent regarding:

A process flow is one of a single phase fluid and a multi-phase mixture in regard to claim 3;

A piezoelectric film sensor includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT in regard to claim 9;

A piezoelectric film includes a pair of conductors disposed on opposing surfaces of the piezoelectric-film in regard to claim 10;

Each (of) the pair of conductors is a coating of silver ink in regard to claim 11;

A piezoelectric film extends around a substantial portion of the circumference of a pipe in regard to claim 12;

Pressure signals are indication of vortical disturbances within a fluid flow in regard to claim 19;

A parameter of a fluid is one of velocity of a process flow and volumetric flow of the process fluid in regard to claim 20;

A signal processor determines the slope of a convective ridge in the k-w plane to determine the velocity of a fluid flowing in a pipe in regard to claim 21;

A signal processor determines volumetric flow rate of a fluid flowing in a pipe in response to the velocity of the fluid in regard to claim 22;

A signal processor generates a flow velocity signal indicative of the velocity of a fluid flowing within a pipe by cross-correlating pressure signals in regard to claim 23;

Pressure sensors are mounted to the outer surface of the pipe in regard to claim 26;

And pressure sensors are mounted to the outer surface of the pipe by an adhesive in regard to claim 27.

Gysling 9069 teaches:

A process flow is one of a single phase fluid and a multi-phase mixture in regard to claim 3

(e.g.; ¶ 0055);

A piezoelectric film sensor includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT in regard to claim 9

(e.g.; ¶ 0075);

A piezoelectric film includes a pair of conductors disposed on opposing surfaces of the piezoelectric-film in regard to claim 10

(e.g.; ¶ 0077);

Each (of) the pair of conductors is a coating of silver ink in regard to claim 11

(e.g.; ¶ 0077);

A piezoelectric film extends around a substantial portion of the circumference of a pipe in regard to claim 12

(e.g.; ¶ 0077);

Pressure signals are indication of vortical disturbances within a fluid flow in regard to claim 19

(e.g.; ¶ 0056);

A parameter of a fluid is one of velocity of a process flow and volumetric flow of the process fluid in regard to claim 20

(e.g.; ¶ 0061);

A signal processor determines the slope of a convective ridge in the k-w plane to determine the velocity of a fluid flowing in a pipe in regard to claim 21

(e.g.; ¶ 0048; figure 39);

A signal processor determines volumetric flow rate of a fluid flowing in a pipe in response to the velocity of the fluid in regard to claim 22

(e.g.; ¶ 0061);

A signal processor generates a flow velocity signal indicative of the velocity of a fluid flowing within a pipe by cross-correlating pressure signals in regard to claim 23

(e.g.; ¶ 0164-0165);

Pressure sensors are mounted to the outer surface of the pipe in regard to claim 26

(e.g.; ¶ 0085; figures 11, 13 and 34);

And pressure sensors are mounted to the outer surface of the pipe by an adhesive in regard to claim 27

(e.g.; ¶ 208).

Regarding claim 3, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a process flow within a pipe with the teaching of Gysling 9069 of a process flow is one of a single phase fluid and a multi-phase mixture because measuring the average properties of a mixture is important in many industrial application since it is the mass averaged properties of the working fluid that enter directly into monitoring the thermodynamic performance of many processes.

Regarding claim 9, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film sensor attached to a strap with the teaching of Gysling 9069 of a piezoelectric film sensor includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT because a piezoelectric film generates an electrical signal proportional to the degree that the material (to which it is attached) is mechanically deformed or stressed.

Regarding claim 10, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film sensor with the teaching of Gysling 9069 of a piezoelectric film includes a pair of conductors disposed on opposing surfaces of the piezoelectric-film because a pair of conductors disposed on opposing surfaces of the piezoelectric-film would have increased sensitivity of the sensor.

Regarding claim 11, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film sensor with the teaching of Gysling 9069 of each (of) the pair of conductors is a coating of silver ink because silver ink conductors would have low electrode resistivity characteristics.

Regarding claim 12, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film sensor with the teaching of Gysling 9069 of a piezoelectric film extends around a substantial portion of the circumference of a pipe because a piezoelectric sensing element extending around a substantial portion of the circumference of a pipe would have allowed complete or nearly complete circumferential measurement of induced strain.

Regarding claim 19, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a pressure signals with the teaching of Gysling 9069 of pressure signals are indication of vortical disturbances within a fluid flow because the unsteady pressures produced by acoustical and/or vortical disturbances within a pipe would have been indicative of a parameter of the single phase fluid or multiphase mixture.

Regarding claim 20, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a parameter of the process flow flowing within a pipe with the teaching of Gysling 9069 of a parameter of a fluid is one of velocity of a process flow and the process fluid because volumetric flow of the velocity of vortical disturbances is related to the velocity of the mixture and would have allowed the volumetric flow rate to be determined.

Regarding claim 21, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a signal processor with the teaching of Gysling 9069 of a signal processor determines the slope of a convective ridge in the k-w plane to determine the velocity of a fluid flowing in a pipe because the convective velocity of turbulent eddies, and thus a flow rate within a pipe, would have been determined by constructing a k-α plot from the output of a phased array of sensors and identifying the slope of the convective ridge.

Regarding claim 22, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a signal processor with the teaching of Gysling 9069 of a signal processor determines volumetric flow rate of a fluid flowing in a pipe in response to the velocity of the fluid because volumetric flow of the velocity of vortical disturbances is related to the velocity of the mixture and would have allowed the volumetric flow rate to be determined.

Regarding claim 23, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a signal processor with the teaching of Gysling 9069 of a signal processor generates a flow velocity signal indicative of the velocity of a fluid flowing within a pipe by cross-correlating pressure signals because a majority of industrial process flows involve turbulent flow which govern many of the flow properties of practical interest including the pressure drop, heat transfer, and mixing. Therefore understanding the time-averaged velocity profile in turbulent flow provides a means to interpret the relationship between speed at which coherent structures convect and the volumetrically averaged flow rate.

Regarding claim 26, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film sensor attached to the outer surface of a strap and/or the inner surface of the strap with the teaching of Gysling 9069 of a pressure sensors mounted to the outer surface of the pipe because sensors electrical or optical strain gages or any other sensor capable of measuring the unsteady pressures within a pipe would have been attached to or embedded in the outer or inner wall of a pipe to measure pipe wall strain.

Regarding claim 27, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film sensor attached to the outer surface of a strap and/or the inner surface of the strap with the teaching of Gysling 9069 of pressure sensors mounted to the outer surface of the pipe by an adhesive because pressure sensors, including electrical strain gages, optical fibers and/or gratings among others, would have been attached to a pipe by adhesive, glue, epoxy, tape or other suitable attachment means to ensure suitable contact between a sensor and a pipe.

Reasons For Allowance

6 Claims 13-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

Claim 13 recites, in part, "piezoelectric film has a thickness greater than 8 mm". This feature in combination with the remaining claimed structure avoids the prior art of record.

Claim 14 recites, in part, "piezoelectric film has a thickness between 8 mm and 120 mm". This feature in combination with the remaining claimed structure avoids the prior art of record.

Claim 15 recites, in part, "includes an electrical insulator between the piezoelectric film and the strap". This feature in combination with the remaining claimed structure avoids the prior art of record.

It is these limitations, which are not found, taught or suggested in the prior art of record, and are recited in the claimed combination that makes these claims allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

7 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas N Washburn whose telephone number is (571) 272-2284. The examiner can normally be reached on Monday through Thursday 6:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DNW

MICHAEL NGHIEM
PRIMARY EXAMINER

3/3/05